

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A legged mobile robot ~~made up by~~including a plurality of joint sites ~~and~~including a plurality of mobile legs, comprising:  
~~a controlling unit configured to control~~means for controlling characteristics of an actuator ~~at one of said plurality of joint sites for controlling~~carrying out, in combination, the ~~control of a~~ gain and ~~a~~ phase compensation of a servo controller ~~belonging to~~of said actuator at each of said joint sites and the ~~control of~~for controlling a viscous resistance of an actuator motor.

Claim 2 (Currently Amended): The legged mobile robot according to claim 1,  
wherein said ~~controlling unit~~means for controlling the actuator characteristics sets, ~~for when~~ the actuator ~~of the joint site~~is in need of high precision positioning control and/or orientation stability, ~~the~~a low range gain ~~to a large value~~, ~~the~~a quantity of phase lead in the high frequency range ~~to a small value~~, and the viscous resistance of the ~~joint~~actuator motor to a large value, ~~to a small value and to a large value, respectively~~.

Claim 3 (Currently Amended): The legged mobile robot according to claim 1,  
wherein said ~~means for controlling the actuator characteristics~~controlling unit sets, ~~for when~~ the actuator ~~of the joint site~~is in need of mechanical passiveness and fast response characteristics, ~~the~~a low range gain ~~to a small value~~, ~~the~~a quantity of phase lead ~~to a large~~

value, and the viscous resistance of the jointactuator motor to a small value, to a large value and to a small value, respectively.

Claim 4 (Currently Amended): The legged mobile robot according to claim 1, wherein said ~~means for controlling the actuator characteristics~~controlling unit sets, ~~for when~~ the actuator ~~of the joint site~~is in need of buffering ~~the~~ force of impact and performing followup control of ~~the~~ high frequency range, ~~the~~ low range gain to a small value, ~~the~~ quantity of phase lead to a large value, and the viscous resistance of the ~~jointactuator motor~~ to a small value, to a large value and to a small value, respectively.

Claim 5 (Currently Amended): The legged mobile robot according to claim 1, wherein said ~~means for controlling the actuator characteristics~~controlling unit switches between first actuator characteristics of setting the actuator ~~of each joint site~~ to a large value of ~~the~~ low range gain, a small quantity of ~~the~~ phase lead, and ~~to~~ a large value of the viscous resistance of the ~~jointactuator motor~~ and second actuator characteristics of setting the actuator ~~of each joint site~~ to a small value of the low range gain, a large quantity of the phase lead, and ~~to~~ a small value of the viscous resistance of the ~~jointactuator motor~~, at each step of a shifting operation on legs.

Claim 6 (Currently Amended): The legged mobile robot according to claim 5, wherein said ~~means for controlling the actuator characteristics~~controlling unit switches between first actuator characteristics of setting the actuator ~~of each joint site~~ to a large value of the low range gain, a small quantity of the phase lead, and ~~to~~ a large value of the viscous

resistance of the jointactuator motor and second actuator characteristics of setting the actuator of each joint site to a small value of the low range gain, a large quantity of the phase lead, and to-a small value of the viscous resistance of the jointactuator motor, at each step of a walking operationmovement on legs.

Claim 7 (Currently Amended): The legged mobile robot according to claim 6,  
wherein said ~~means for controlling the actuator characteristics~~controlling unit sets, at a stage of commencing the walking movement, the characteristics of actuators for ~~respective~~ joint sites of a knee joint pitch axis, ankle roll and pitch axes, body trunk roll, pitch, and yaw axes, hip joint roll and pitch axes, and a neck pitch axis to a large value of the low range gain, a small quantity of phase lead in ~~the~~a high frequency range, and to-a large value of the viscous resistance of the jointactuator motor, and ~~wherein said means for controlling the actuator characteristics~~controlling unit sets the characteristics of actuators for ~~respective~~ joints of a shoulder pitch axis and an elbow pitch axis to a small value of the low range gain, a large quantity of the phase lead, and to-a small value of the viscous resistance of the jointactuator motor.

Claim 8 (Currently Amended): The legged mobile robot according to claim 6,  
wherein said ~~means for controlling the actuator characteristics~~controlling unit sets, at a stage when ~~the~~a leg in a flight state is uplifted and ~~the~~a reactive force from ~~the~~a floor, received by ~~the~~a foot sole ~~there~~of, is equal to zero, for characteristics of actuators for ~~the~~a knee joint pitch axis, ankle roll axis and ~~the~~an ankle pitch axis of the leg in the flight state, a small value of

the low range gain, a large quantity of the phase lead, and a small value of the viscous resistance of the jointactuator motor.

Claim 9 (Currently Amended): The legged mobile robot according to claim 6,  
wherein said ~~means for controlling the actuator characteristics~~controlling unit sets, at a stage  
when the walking movement of thea leg in a flight state proceeds and the leg touches thea  
floor, with thea reactive force from the floor, received by thea foot sole thereof, ~~being~~  
approximately equal to that ~~during the time~~ when both legs are in thea stance position, the  
characteristics of actuators for thea knee joint pitch axis, ankle roll axis, and thea ankle pitch  
axis of the leg previously in the flight state to a large value of the low range gain, a small  
quantity of the phase lead in thea high frequency range, and ~~to~~ a large value of the viscous  
resistance of the jointactuator motor.

Claim 10 (Currently Amended): The legged mobile robot according to claim 6,  
wherein, in each stage of the walking movement, said ~~means for controlling the actuator~~  
characteristicscontrolling unit sets, for characteristics of actuators for driving the ~~respective~~  
joints in which emphasis is placed on thea positioning accuracy, first characteristics in which  
the low range gain is of a large value, the quantity of phase lead is of a small value, and the  
viscous resistance of the actuator motorjoint is of a large value.

Claim 11 (Currently Amended): The legged mobile robot according to claim 6,  
wherein, in each stage of the walking movement, said ~~means for controlling the actuator~~  
characteristicscontrolling unit sets, for characteristics of actuators for driving the ~~respective~~

joints in which emphasis is placed on ~~thea~~ mechanical passiveness or on ~~the~~ fast response characteristics, second actuator characteristics in which the low range gain is of a small value, the quantity of phase lead is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 12 (Currently Amended): The legged mobile robot according to claim 6, wherein, in each stage when ~~thea~~ link state formed by ~~thea~~ floor touchdown site of the ~~robot~~ body of the legged mobile robot and ~~thea~~ floor surface is changed ~~ever~~ between ~~the~~ an open link state and ~~thea~~ closed link state, said means for controlling the actuator characteristicscontrolling unit switches, during the walking movement, the characteristics of the actuators driving the respective joints between first actuator characteristics and second actuator characteristics.

Claim 13 (Currently Amended): The legged mobile robot according to claim 5, wherein, in each stage of the legged mobile robot going up or down ~~the~~ stairs, said means for controlling the actuator characteristicscontrolling unit switches characteristics of actuators the actuator of respective joint sites between first actuator characteristics in which the low range gain is of a large value, the quantity of the phase lead is of a small value, and the viscous resistance of the actuator motorjoint is of a large value and second actuator characteristics in which the low range gain is of a small value, the quantity of the phase lead is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 14 (Currently Amended): The legged mobile robot according to claim 13,  
wherein, in a stage when both legs are in ~~thea~~ stance position prior to going up or down the  
stairs, in ~~the course of the an~~ operation of going up or down the stairs, said ~~means for~~  
~~controlling the actuator characteristics~~controlling unit sets ~~the~~ characteristics of the ~~actuators~~  
~~of all of the~~actuator at each joint sitesites, to the first actuator characteristics in which the low  
range gain is of a large value, the quantity of the phase lead in ~~at~~ the high frequency range is of  
a small value, and the viscous resistance of the actuator motor~~joint~~ is of a large value.

Claim 15 (Currently Amended): The legged mobile robot according to claim 13,  
wherein, in a stage when a first step is made for going up or down the stairs, in ~~the course of~~  
~~the an~~ operation of going up or down the stairs, said ~~means for controlling the actuator~~  
~~characteristics~~controlling unit sets the characteristics of the actuators of ~~thea~~ knee joint pitch  
axis and ~~the an~~ ankle roll and pitch axes of ~~thea~~ leg in ~~thea~~ flight condition to ~~the~~ second  
actuator characteristics in which the low range gain is of a small value, the quantity of the  
phase lead is of a large value, and the viscous resistance of the actuator motor~~joint~~ is of a  
small value.

Claim 16 (Currently Amended): The legged mobile robot according to claim 13,  
wherein, in a stage when ~~thea~~ leg of ~~at~~ the first step has touched ~~thea~~ tread face one step higher  
or lower, in ~~the course of~~ going up or down the stairs, said ~~means for controlling the actuator~~  
~~characteristics~~controlling unit sets the characteristics of the ~~actuators of all of the~~actuator at  
each joint sitesites to the first actuator characteristics in which the low range gain is of a large

value, the quantity of the phase lead in ~~at~~ the high frequency range is of a small value, and the viscous resistance of the actuator motorjoint is of a large value.

Claim 17 (Currently Amended): The legged mobile robot according to claim 13, wherein, in a stage when ~~the~~ a leg which touches ~~the~~ a tread one step higher or lower ~~becomes~~ ~~a leg in the reaches a~~ stance state, and ~~the~~ another leg which has so far been ~~the~~ leg in ~~the~~ stance position is uplifted, in the course of going up or down ~~the~~ stairs, said ~~means for~~ ~~controlling the actuator characteristics~~ controlling unit sets the characteristics of the actuators of ~~the~~ an ankle roll axis and ~~the~~ an ankle pitch axis of the uplifted leg in the ~~flight condition~~ to second actuator characteristics in which the low frequency range gain is of a small value, the quantity of the phase lead is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 18 (Currently Amended): The legged mobile robot according to claim 13, wherein, in a stage when ~~the~~ a second step has touched ~~the~~ a tread two steps higher in the course of going up or down ~~the~~ stairs, said ~~means for controlling the actuator characteristics~~ controlling unit sets the characteristics of the actuators of all of ~~the~~ actuator at each joint site to the first actuator characteristics in which the low range gain is of a large value, the quantity of the phase lead in ~~the~~ a high frequency range is of a small value, and the viscous resistance of the actuator motorjoint is of a large value.

Claim 19 (Currently Amended): The legged mobile robot according to claim 13, wherein, in each stage of ~~the movement~~ of going up or down the stairs, said ~~means for~~

~~e~~ontrolling the actuator characteristicscontrolling unit sets the characteristics of the actuators for driving respective joints[[],] for which emphasis is placed on positioning accuracy, to first actuator characteristics in which the low range gain is of a large value[[],] the quantity of the phase lead is of a small value, and the viscous resistance of the actuator motorjoint is of a large value.

Claim 20 (Currently Amended): The legged mobile robot according to claim 13,  
wherein, in each stage of the movement of going up or down the stairs, said means for  
~~e~~ontrolling the actuator characteristicscontrolling unit sets the characteristics of the actuators for driving respective joints[[],] for which emphasis is placed on mechanical passiveness or fast response characteristics[[],] to second actuator characteristics in which the low range gain is of a small value, the quantity of the phase lead is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 21 (Currently Amended): The legged mobile robot according to claim 13,  
wherein, in each stage of switching of the link state defined by the floor touching site of the ~~robot body of the legged mobile robot and the~~ floor surface, in the course of going up or down the stairs, between the open link state and the closed link state, said means for  
~~e~~ontrolling the actuator characteristicscontrolling unit switches the characteristics of the actuators driving respective joints between the first actuator characteristics and the second actuator characteristics.

Claim 22 (Currently Amended): The legged mobile robot according to claim 5,  
wherein, in each stage of ~~thea~~ turning movement of the ~~robot~~ body of the legged mobile  
robot, said ~~means for controlling the actuator characteristics~~controlling unit switches the  
actuators of the respective joint sites between first actuator characteristics in which the low  
range gain is of a large value, the quantity of the phase lead is of a small value, and the  
viscous resistance of the actuator motorjoint is of a large value and second actuator  
characteristics in which the low range gain is of a small value, the quantity of the phase lead  
is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 23 (Currently Amended): The legged mobile robot according to claim 22,  
wherein, in a stage of commencing ~~thea~~ turning movement of the ~~robot~~ body of the legged  
mobile robot, said ~~means for controlling the actuator characteristics~~controlling unit sets the  
characteristics of the ~~actuators of all of the~~actuator at each joint sites forming the ~~robot~~  
body of the legged mobile robot to a large value of the low range gain, a small quantity of the  
phase lead in ~~thea~~ high frequency range, and to a large value of the viscous resistance of the  
actuator motorjoint.

Claim 24 (Currently Amended): The legged mobile robot according to claim 22,  
wherein, in a stage when ~~thea~~ leg in ~~thea~~ flight state is uplifted and ~~thea~~ reactive force from  
~~thea~~ floor received by ~~thea~~ foot sole thereof is zero, said ~~means for controlling the actuator~~  
characteristicscontrolling unit sets the characteristics of the actuators of ~~thea~~ knee joint pitch  
axis and ~~the~~ ankle roll and pitch axes of the leg in the flight state to a small value of the low

range gain, a large quantity of phase lead, and to-a small value of the viscous resistance of the actuator motorjoint.

Claim 25 (Currently Amended): The legged mobile robot according to claim 22,  
wherein, in a stage when the turning movement of the robot body of the legged mobile robot  
progresses such that thea leg in thea flight state touches thea floor and thea reactive force  
from the floor received by thea foot sole thereof is approximately equal to thea reactive force  
~~during the time when both legs are in the flight state, said means for controlling the actuator~~  
~~characteristicscontrolling unit~~ sets ~~the~~ characteristics of the actuators of thea knee joint pitch  
axis and ~~the~~ ankle roll and pitch axes of thea leg in thea stance state to a large low range gain,  
a small quantity of phase lead in the high frequency range, and to-a large viscous resistance of  
the actuator motorjoint.

Claim 26 (Currently Amended): The legged mobile robot according to claim 22,  
wherein, in each stage of the turning movement, said ~~means for controlling the actuator~~  
~~characteristicscontrolling unit~~ sets ~~the~~ characteristics of the actuators for driving the  
respective joints[[,]] for which emphasis is placed on ~~the~~ positioning accuracy[[,]] to first  
actuator characteristics in which the low range gain is of a large value, the quantity of the  
phase lead is of a small value, and the viscous resistance of the actuator motorjoint is of a  
large value.

Claim 27 (Currently Amended): The legged mobile robot according to claim 22,  
wherein, in each stage of the turning movement, said ~~means for controlling the actuator~~

~~characteristicscontrolling unit~~ sets the characteristics of the actuators for driving the respective joints[[,]] for which emphasis is placed on the mechanical passiveness or fast response characteristics[[,]] to second actuator characteristics in which the low range gain is of a small value, the quantity of the phase lead is of a large value, and the viscous resistance of the actuator motorjoint is of a small value.

Claim 28 (Currently Amended): The legged mobile robot according to claim 22, wherein, in each stage in which ~~thea~~ link state defined by ~~thea~~ floor touch site of the ~~robot~~ body of the legged mobile robot and ~~thea~~ floor surface in the course of the turning movement is switched between ~~thean~~ open link state and ~~thea~~ closed link state, said ~~means for~~ ~~controlling the actuator characteristics~~controlling unit switches the characteristics of the actuators for driving the respective joints between the first actuator characteristics and the second actuator characteristics.